

Standards Alignment

National Core Curriculum Standards in Science

http://www.nap.edu/catalog.php?record_id=4962

K-4 Standards:

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described. (K-4 Standard, p. 134)
- Objects in the sky have patterns of movement. The sun, for example, appears to move across the sky in the same way every day, but its path changes slowly over the seasons. The moon moves across the sky on a daily basis much like the sun. The observable shape of the moon changes from day to day in a cycle that lasts about a month. (K-4 Standard, p. 134)
- (Motions and Forces) The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull. (K-4 Standard, p. 127)
- Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population. (K-4 Standard, p. 140)
- Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel, and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety. (K-4 Standard, p. 140)

5-8 Standards: (Page 154)

- (Transfer of Energy, p. 155): The sun is a major source of energy for changes on the earth's surface.
- (Living Systems, p. 157) An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species' evolutionary history.
- (Earth, p. 160) The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system. (5-8 Standard)
- (Earth, p. 161) Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the

earth's surface and explains the phenomena of the tides. (5-8 Standard)

- (Earth, p. 161) Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses. (5-8 Standard)
- (Earth, p. 161) The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day. (5-8 Standard)
- (Science and Technology, p. 166) Technological designs have constraints. Some constraints are unavoidable, for example, properties of materials, or effects of weather and friction; other constraints limit choices in the design, for example, environmental protection, human safety, and aesthetics.
- (Personal Health, p. 168) Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.

9-12 Standards: (Page 154)

- (Forces, p. 180) Gravitation is a universal force that each mass exerts on any other mass. The strength of the gravitational attractive force between two masses is proportional to the masses and inversely proportional to the square of the distance between them.
- (Matter, energy and organization, p. 186) The distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials.
- (Environmental Quality, p. 198) Many factors influence environmental quality. Factors that students might investigate include population growth, resource use, population distribution, overconsumption, the capacity of technology to solve problems, poverty, the role of economic, political, and religious views, and different ways humans view the earth.

TEKS - Texas Essential Knowledge and Skills for Science

<http://ritter.tea.state.tx.us/rules/tac/chapter112/index.html>

- Elementary Concepts Covered: 1.6A, 2.8D, 3.6A, 3.7C, 4.7C, 4.9A, 5.7C, and 5.8D
- Elementary Content Referenced: 1.8B, 2.6C, and 3.8C
- Middle School Concepts Covered: 6.11B, 6.11C, 7.9A, and 8.6C
- Middle School Content Referenced: 6.8B, 7.5A, 7.10A, and 8.11B
- High School Astronomy Content Referenced: 4D, 8C, 14A, 14B, and 14E
- High School Earth and Space Science Content Referenced: 3E, 5D, 11D, and 12C

In parenthesis at the end of each standard is the scene in the movie where the standard is specifically addressed.

Elementary Science Standards

First Grade

- (6) Force, motion, and energy. The students knows that force, motion, and energy are related and are a part of everyday life. The student is expected to:
 - (A) identify and discuss how different forms of energy such as light, heat, and sound are important to everyday life. (D1)
- (8) Earth and space. The student knows that the natural world includes the air around us and objects in the sky. The student is expected to:
 - (B) observe and record changes in the appearance of objects in the sky such as clouds, the Moon, and stars, including the Sun; (A7)

Second Grade

- (6) Force, motion, and energy. The student knows that forces cause change and energy exists in many forms. The student is expected to:
 - (B) observe and record changes in the appearance of objects in the sky such as clouds, the Moon, and stars, including the Sun; (A7)
- (8) Earth and space. The student knows that there are recognizable patterns in the natural world and among objects in the sky. The student is expected to:
 - (D) observe, describe, and record patterns of objects in the sky, including the appearance of the Moon. (A7)

Third Grade

- (6) Force, motion, and energy. The student knows that forces cause change and that energy exists in many forms. The student is expected to:

- (A) explore different forms of energy, including mechanical, light, sound, and heat/thermal in everyday life; (D1)
- (7) Earth and space. The student knows that Earth consists of natural resources and its surface is constantly changing. The student is expected to:
 - (C) identify and compare different landforms, including mountains, hills, valleys, and plains; and (A5)
- (8) Earth and space. The student knows there are recognizable patterns in the natural world and among objects in the sky. The student is expected to:
 - (C) construct models that demonstrate the relationship of the Sun, Earth, and Moon, including orbits and positions; and

Fourth Grade

- (7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:
 - (C) identify and classify Earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation. (D1)
- (9) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:
 - (A) investigate that most producers need sunlight, water, and carbon dioxide to make their own food, while consumers are dependent on other organisms for food; (D1)

Fifth Grade

- (5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:
 - (C) demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand; and (B3)

Middle School

Sixth Grade

- (8) Force, motion, and energy. The student knows force and motion are related to potential and kinetic energy. The student is expected to:
 - (B) identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces; (D1)
- (11) Earth and space. The student understands the organization of our solar system and the relationships among the various bodies that comprise it. The student is expected to:

- (B) understand that gravity is the force that governs the motion of our solar system;(B2)

Seventh Grade

- (5) Matter and energy. The student knows that interactions occur between matter and energy. The student is expected to:
 - (A) recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis;(D1)
- (9) Earth and space. The student knows components of our solar system. The student is expected to:
 - (A) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere; and (D1)
- (10) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to:
 - (A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms; (D1)

Eighth Grade

- (6) Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:
 - (C) investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches. (D1)
- (11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:
 - (B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition; (D1)

Astronomy:

- (4) Science concepts. The student recognizes the importance and uses of astronomy in civilization. The student is expected to:
 - (D) explain the contributions of modern astronomy to today's society, including the identification of potential asteroid/comet impact hazards and the Sun's effects on communication, navigation, and high-tech devices.(A3, A4, A5, and C2)

- (8) Science concepts. The student knows the reasons for the seasons. The student is expected to:
- (C) recognize that the angle of incidence of sunlight determines the concentration of solar energy received on Earth at a particular location; and
- (14) Science concepts. The student recognizes the benefits and challenges of space exploration to the study of the universe. The student is expected to:
- (A) identify and explain the contributions of human space flight and future plans and challenges; (A3, A4, and A5)
 - (B) recognize the advancement of knowledge in astronomy through robotic space flight; (C2)
 - (E) demonstrate an awareness of new developments and discoveries in astronomy.(C6)

Earth and Space Science

- (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:
- (E) explore careers and collaboration among scientists in Earth and space sciences; (C6 and C7)
- (5) Earth in space and time. The student understands the solar nebular accretionary disk model. The student is expected to: (B2)
- (D) explore the historical and current hypotheses for the origin of the Moon, including the collision of Earth with a Mars-sized planetesimal;
- (11) Solid Earth. The student knows that the geosphere continuously changes over a range of time scales involving dynamic and complex interactions among Earth's subsystems. The student is expected to:
- (D) interpret Earth surface features using a variety of methods such as satellite imagery, aerial photography, and topographic and geologic maps using appropriate technologies; and (C5)
- (12) Solid Earth. The student knows that Earth contains energy, water, mineral, and rock resources and that use of these resources impacts Earth's subsystems. The student is expected to:
- (C) discriminate between renewable and nonrenewable resources based upon rate of formation and use; (D1)

Next Generation Science Standards (DRAFT)

(A revision of A Framework for K-12 Science Education)

http://www.nap.edu/catalog.php?record_id=13165

Note: many of these standards are demonstrated but not discussed specifically. Teachers can use the video to start a discussion of these topics.

ESS2.E: Biogeology

§ Plants and animals (including humans) depend on the land, water, and air to live and grow. They in turn can change their environment (e.g., the shape of land, the flow of water).

ESS3.A: Natural Resources

§ Living things need water, air, and resources from the land, and they try to live in places that have the things they need. Humans use natural resources for everything they do: for example, they use soil and water to grow food, wood to burn to provide heat or to build shelters, and materials such as iron or copper extracted from the earth to make cooking pans.

PS3.B: Conservation of Energy and Energy Transfer

§ Sunlight warms Earth's surface. (a)

ETS2.B: Interactions of Engineering, Technology, Science, Society, and the Natural Environment

§ People depend on various technologies in their lives; human life would be very different without technology.

ESS1.B: Earth and the Solar System

§ Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

ESS2.A: Earth Materials and Systems

§ _Wind and water can change the shape of the land. The resulting landforms, together with the materials on the land, provide homes for living things. (b),(c),(d)

ESS2.C: The Roles of Water in Earth's Surface Processes

§ _Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. It carries soil and rocks from one place to another and determines the variety of life forms that can live in a particular location.

LS2.A: Interdependent Relationships in Ecosystems

§ _Animals depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Animals depend on plants or other animals for food. (a)

§ _Plants depend on air, water, minerals (in the soil), and light to grow. (b)

ETS2.B: Interactions of Engineering, Technology, Science, Society, and the Natural Environment

§ _When new technologies become available, they can bring about changes in the way people live and interact with one another.

ESS3.A: Natural Resources

§ _All materials, energy, and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

PS2.B: Types of Interactions

§ _The gravitational force of Earth acting on an object near Earth's surface pulls that object towards the planet's center.

ESS1.A: The Universe and Its Stars

§ _Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.

ESS1.B: Earth and the Solar System

§ _The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. This system appears to have formed from a disk of dust and gas, drawn together by gravity.

ESS3.A: Natural Resources

§ _Humans depend on Earth's ocean, atmosphere, and biosphere for many different resources. Fresh water and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of weather-and climate-related processes. (

ESS3.A: Natural Resources

§ _Resource availability has guided the development of human society. Resource availability affects geopolitical relationships and can limit development. (a)

§ _All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (b)

§ _As the global human population increases and people's demands for better living conditions increase, resources considered readily available in the past, such as land for agriculture or drinkable water, are becoming scarcer and more valued.

ESS3.C: Human Impacts on Earth Systems

§ _The sustainability of human societies and the biodiversity that supports them

requires responsible management of natural resources.

PS2.A: Forces and Motion

§ _The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. (b),(f)

§ _The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (d)

PS4.C: Information Technologies and Instrumentation

§ _Appropriately designed technologies (e.g., radio, television, cell phones, wired and wireless computer networks) make it possible to detect and interpret many types of signals that cannot be sensed directly. Designers of such devices must understand both the signal and its interactions with matter.

Crosscutting:

Influence of Engineering, Technology, and Science on Society and the Natural World

Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. Therefore, taking natural materials to make things impacts the environment.